Ethernet Terminal Server

ELS-8 Terminal Server
ELS-16 Terminal Server
Installation and Management

EQUINOX

PN560068

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ELS-16 Terminal Server
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ELS-8 / ELS-16 Terminal Server Manual
Part Number 560068/Rev B
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Equinox Systems Inc.
One Equinox Way
Sunrise, Florida 33351-6709

(954) 746-9000
BBS (954) 746-0282
FAX (954) 746-9101

Warning This equipment has been tested and found to comply with the limits for Class A Digital Device, pursuant to Part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses and can radiate radio frequency energy, and if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

Operation is subject to the following conditions:

- This device may cause harmful interference.
- This device must accept any interference received, including interference that may cause undesired operation.

115 volt cord set requirements UL Listed Cord Set: minimum of 18 AWG; type SVT or SJT three-conductor cord; maximum 15-feet in length; parallel blade, grounding type attachment plug rated 15 A 125 V.

220 volt (international) cord set requirements Minimum of 18 AWG; grounding type attachment plug rated 15 A, 220 V. Cord Set should have appropriate safety approvals for the country in which the equipment will be installed and marked HAR.

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Introduction

The ELS-8 and ELS-16 are dual protocol terminal servers which support LAT (Local Area Transport) and TCP/IP (Transmission Control Protocol/Internet Protocol). Both servers offer high performance and connection for 8 or 16 terminals, PCs, printers, modems and hosts to an Ethernet network. *The ELS-8 / ELS-16 Terminal Server Manual* is your guide to installing, configuring, managing and using the ELS-8 and the ELS-16 Terminal Servers. This manual contains the following:

Chapter 1 Getting Started — Describes the ELS-8 and ELS-16 Terminal Servers. This chapter provides a quick reference guide to assist you in locating additional help during the installation, configuration and management of your server.

Chapter 2 Hardware Installation — Describes the correct installation of the ELS-8 and the ELS-16 terminal servers as freestanding or wall-mounted units. This chapter describes the terminal server unit and general operation of the system LEDs.

Chapter 3 Terminal Server Basics — Whether you plan to use the LAT protocol, TCP/IP, or a combination of the two, there are basic principles that apply to all protocols. This chapter tells you what to expect when you plug in your server, and how to return the server to factory default settings. This chapter also provides you with an introduction to commands and use of the remote console.

Chapter 4 Using LAT Protocol — If you are using your ELS-8 or ELS-16 as a LAT terminal server, this section will assist you in configuring your server, services and ports for the LAT protocol. Examples of installing for different device types provide specific help in configuring modems, terminals, printers and host computers.

Chapter 5 Using TCP/IP Protocol	If you are using your ELS-8 or ELS-16 as a TCP/IP terminal server, this chapter will assist you in configuring your server, services, nodes and ports for the TCP/IP protocol. Examples of installing for different device types provide specific help in configuring modems, terminals, printers and host computers.
Section 6 Using Dual Protocol	If you are using your ELS-48 as both a LAT and a TCP/IP terminal server, this chapter will assist you in using your terminal server as a dual protocol server.
Appendix A Commands	There are many commands that help you to configure, manage and use your terminal server. Appendix A provides details for each command available to you on the ELS-8 and ELS-16.
Appendix B Wiring	This appendix contains detailed wiring diagrams for the connectors and accessories that you can connect to the ELS-8 and ELS-16.
Appendix C Troubleshooting	Occasionally you may experience a problem, or have a question, about a specific action on your terminal server. This appendix provides you with help in solving the most commonly encountered problems in configuring and managing the ELS-8 and ELS-16.
Appendix D Messages	Messages assist you in identifying problems you may encounter when using your terminal server. This appendix describes each message and recovery procedures where applicable.
Glossary	The glossary contains brief definitions of terms that may be unfamiliar to you. Refer to this section when you need additional help in understanding new words or concepts.

Equinox Terminal Server Commands and Messages Manual Equinox Part Number 560058
This is an in depth reference manual that covers all of the terminal server commands and messages. Contact Customer Service at (954) 746-9000 for more information.

Release Notes
Provides the latest information about the ELS-8 and ELS-16 Terminal Servers. Release notes are available with the distribution of software revisions.

Equinox Bulletin Board
Equinox provides a 24-hour electronic bulletin board service. Current revisions of software, release notes, and general information are maintained on the BBS. Messages can be left for Equinox staff, including technical support. Call Equinox for the phone number (954) 746-9000.

Document Conventions

The following conventions are used in this manual:

- **References to the ELS-8 / ELS-16**
  All material covered in this manual refers to both the ELS-8 and the ELS-16 Terminal Servers unless specifically noted otherwise.

- **Return Key**
  [RETURN] indicates you should press the return key on your keyboard. The **[RETURN]** key is sometimes labeled **[ENTER]** on certain keyboards. They are synonymous.

- **lowercase**
  Lowercase letters in command lines indicate keywords that must be entered. They can be entered in either uppercase or lowercase. Command keywords can be abbreviated to the first two or three characters in most cases.

- ***lowercase italics***
  Lowercase italics in command lines indicate variables which you supply to the command.

- { }
  Braces indicate choices you must make when entering commands. The braces are not included when entering the command.

- [ ]
  Square brackets indicate choices that are optional when you enter a command. You can choose to not enter an option or select one of the options. The brackets are not included when entering the command.

Chapter 1 Getting Started

The Equinox ELS-8 and ELS-16 Terminal Servers provide all of the high performance features found in our larger dual-protocol servers. This chapter provides a brief overview of major features.

You want to be sure that you have received everything needed to install and use your terminal server. A checklist in this chapter provides you with a quick way to verify you have all you need to get started.

The ELS-8 and ELS-16 Terminal Servers include these features:

- **Self Booting.** When you power up the ELS-8 or ELS-16 there is no need for a host to be present on the network to download the software. The terminal server powers up and comes to a run state immediately.

- **Support for TCP/IP and LAT Protocols.** Industry standard TCP/IP and DEC's LAT protocol are fully supported for seamless and concurrent access to DEC and UNIX hosts.

- **8 or 16 Serial Ports.** Eight and sixteen port versions are offered with industry standard RJ-45 connectors. Full modem control is supported.

- **Parallel Printer Port.** Built-in PC-style parallel port that supports standard Centronics or Dataproducts printers.

- **Thick and Thin Ethernet Interfaces.** Switchable interface permits a choice of Thin Coax or standard 15-pin AUI interface connection to the Ethernet.

- **High Performance Operation.** Custom RISC processors sustain maximum data rates on all ports simultaneously, providing fast response times for graphics applications and print jobs, even when all ports are operating at maximum speed.

- **Easy Software Upgrades.** Upgrades and enhancements are easily accomplished by downloading new operational software from a host into Flash ROM.

- **Multi-session and Split-screen Support.** Up to four concurrent sessions can be established on each port, and the split screen feature permits VT420 or compatible terminals to display two active sessions simultaneously.

Check your ELS-8 / ELS-16 Package

Your ELS-8 / ELS-16 Terminal Server package should include the following items:

ELS-8 or ELS-16 Server Unit

Power Supply

Power Cord

The ELS-8 / ELS-16 Terminal Server Manual

A registration card

If you are missing any of these items, please call the Equinox Sales Department at (954) 746-9000.

Registering Your Server

Complete and mail the enclosed registration card to receive the full benefits of being a registered user.

Equinox Bulletin Board

Additional support is available on the Equinox Bulletin Board. You can use the BBS to leave messages for Technical Support or download current versions of software. Call Equinox for the BBS number (954) 746-9000.

Chapter 2 Hardware Installation

The Equinox ELS-8 and ELS-16 terminal servers connect up to eight or 16 asynchronous serial devices to an Ethernet network. Chapter 2 of this manual describes the hardware installation of the ELS-8 and the ELS-16. With the exception of the number of ports on the server, the ELS-8 and the ELS-16 are identical in installation and configuration.

Planning is an important element of the installation process. You must decide what devices will be connected to the terminal server and where you will physically locate the server. This chapter will help you in this effort.

Review of Installation Steps

Before continuing with the installation, review the steps you will follow during the installation process:

① Decide on the location of the terminal server based on convenience of cabling and power access.

② Unpack all equipment and identify the various components.

③ Mount the server unit.

④ Power on the terminal server by plugging it into an electrical outlet. Check the LEDs to validate correct operation.

⑤ Plug a cable into the Ethernet connector you plan to use:

- DB-15 AUI
- RJ-58 Thin Coaxial

⑥ Install cables between the port boards and the devices.

Planning the Network Installation

Take the following into consideration when you plan the location and installation of your terminal server:

- ❑ What users will be connected to the server?
  - List all of the users who will be connected to the server. List their physical location and their distance from the server.

- ❑ What devices will be supported on the server?
  - List all of the devices that will be connected to the server. List their physical location and their distance from the server.

- ❑ What type of Ethernet cabling will you use to connect the network?
  - There are two types of connectors on the ELS-8 and the ELS-16 terminal servers:

    Determine if you are using *Ethernet transceiver cable* or *thinwire Ethernet interface.*

- ❑ What are the distance specifications for all of the cabling you will be installing?

- ❑ How will you mount the terminal server?
  - Table or Shelf Mount
  - Rack Mount
    Instructions for rack mounting the server are included in the rack mount kit.

- ❑ Will you be using LAT, TCP/IP or dual protocol? What services will be offered?
  - Appendix E contains worksheets that will help you plan your network protocols and services. Complete these worksheets, listing each device and service.

The ELS-8 and the ELS-16 terminal servers are stand-alone devices. The server software is stored in *Flash ROM*. This eliminates the need to download software from a host. The serial ports are industry standard RJ-45 connectors supporting full modem control. The parallel printer port supports standard Centronics or DataProducts printers. A switchable interface lets you choose between thin coax and standard 15-pin AUI connection to the network.

System Unit

The major components of the system unit are described below. Take a moment to familiarize yourself with the various elements.

Front Panel

Figure 2-1 provides an illustration of the front panel of the ELS-8/ELS-16 terminal server.

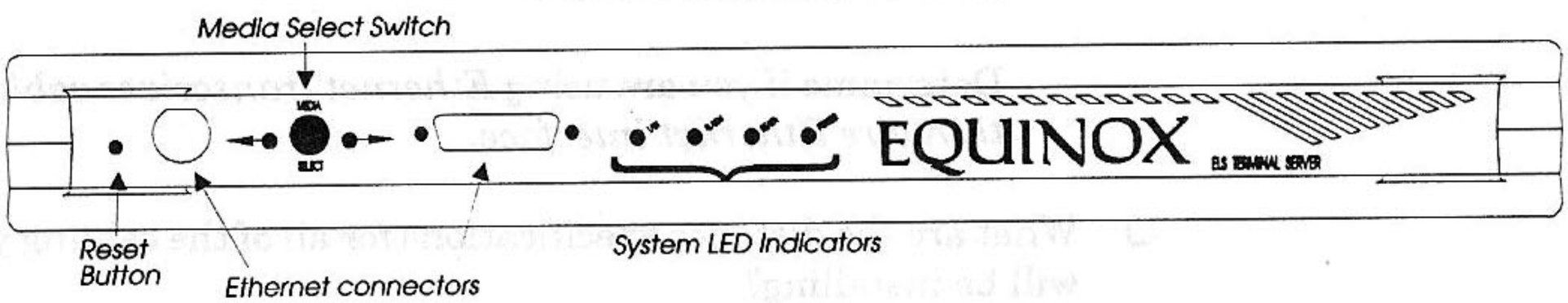


Figure 2-1 ELS-8 / ELS-16 Front Panel

Reset Button

The reset button permits you to easily return the ELS-8 or ELS-16 to factory default settings.

Ethernet Connectors

There are two network connectors on the ELS-8 and the ELS-16: RJ-58 Thin Coax and DB-15 AUI. Plug your network cable into the appropriate connector.

Media Switch

Selects RJ-58 Thin Coax or DB-15 AUI interface.

System LED Indicators

The ELS-8 and the ELS-16 have the following LED's on the front panel of the unit to assist you in monitoring the network:

LAN	Blinks when the server receives or sends messages to or from the network.
ALARM	Light displays solid when a software or hardware failure is encountered.
READY	Light displays solid when the unit is plugged in and receiving power.
PRINTER	Light displays when the parallel printer is in use.

Back Panel

Figure 2-2 provides an illustration of the back panel of the ELS-16 terminal server. The ELS-8 has only eight ports instead of the 16 shown below.

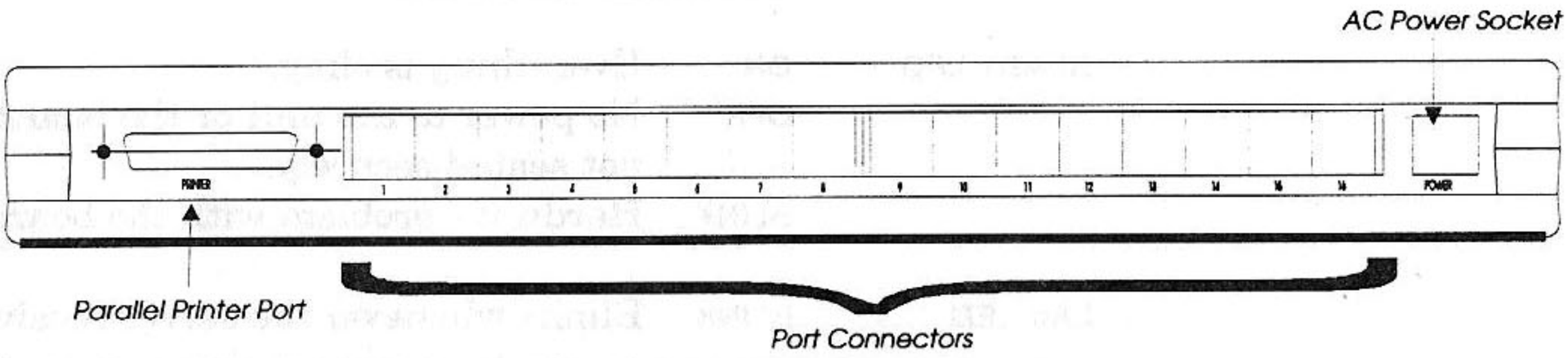


Figure 2-2 ELS-16 Back Panel

Parallel Printer Port

Supports standard Centronics or DataProducts printer.

Port Connectors

8 or 16 ports with industry standard RJ-45 connectors.

AC Power Socket

Power cord plugs into socket.

Locating the Terminal Server

Once you have determined where you are going to locate the terminal server, physically place it using one of the following methods:

Table Mount
Rack Mount (*instructions included with rack mount kit*)

The terminal server requires no special installation if you do not intend to mount it on the wall. The unit can be set flat so that it rests on the four rubber feet located on the bottom of the unit. Or, if space is a problem, it can be set on its side.

Powering on the Terminal Server

You are now ready to power on the terminal server. Plug the female end of the power cord into the back of the server. Plug the other end of the power cord into an electrical outlet.

LED indicators

The READY LED on the front of unit blinks several times and then displays as a solid red LED. Check the following table for the meaning of each of the LEDs on the front of the Ethernet control board:

READY LED	**ON**	Everything is okay.
	OFF	No power to the unit or the board is not seated securely.
	BLINK	Hardware problem with the board.
LAN LED	**BLINK**	Blinks whenever the server receives or sends messages from or to the network. This LED should blink periodically on lightly used networks. On networks that are kept busy with traffic the light could appear solid.
ALARM	**ON**	When a software or hardware failure is encountered an alarm light displays. The alarm LED is cleared automatically when the error condition is corrected.
PRINTER	**ON**	Displays solid when printer port is in use.

Plugging in the Network Cable

Plug the network cable into the appropriate socket on the front of the terminal server unit. The type of cable you plug into the board depends upon how you plan to connect the server to your Ethernet network.

Standard Ethernet Interface

Plug the DB-15 male connector of the Ethernet Transceiver Cable (*Equinox #690197*) into the female DB-15 connector on the front of the terminal server unit. Plug the other end into your Ethernet transceiver. On both ends, slide the latch to securely hold the cable in place.

Thinwire Ethernet Interface

Plug the BNC connector of the thinwire cable to the T-Connector on the terminal server.

IMPORTANT: When you connect thinwire cable, the T-connector **must** be installed **directly** on the BNC connector of the terminal server. **DO NOT** use an extension cable to tap into the thinwire network.

If this server is at the **end** of the thinnet, you should install a terminator directly on the T-Connector.

This section explains how to connect devices to the ELS-8 and the ELS-16 terminal servers. Each of the modular jacks support standard RS-232 DTE signals on 8-pin, RJ-45 modular jacks. Standard modular cable is used to wire the port to your terminal, printer or modem. From there an Equinox modular adaptor routes the signals to a standard RS-232 DB-25 connector.

Modular Cables

Appendix B Wiring provides detailed wiring diagrams for the cables and adapters used with the Equinox terminal servers.

RJ-11 modular cable is the same type of modular flat cable used for wiring telephones inside of buildings. The cable is terminated at each end with an RJ-11 modular plug which is inserted into the modular jack of an appropriate wiring module.

Standard modular cables available from Equinox or wiring distributors are **reversing**; that is the pins are reversed on each end. Some companies sell modular cables that are non standard. These are **straight-through cables** rather than **reversing cables.** Straight-through cable will not work with Equinox wiring accessories.

Although the terminal server uses 8-pin modular jacks, the signal pinouts have been arranged such that 4- and 6- wire modular plugs may be used. The terminal server is designed for quick and simple installation using telephone wiring techniques. All terminal connections may be made using standard telephone twisted pair wiring or modular wiring.

Using Modular Adapters and Cables

Modular adapters are used to adapt modular wiring to the RS-232 connector found on terminals, PCs, modems and printers. (See *Figure 2-3*).

Connecting Parallel Printers

Use a standard PC-type Centronics printer cable to connect a parallel printer to the ELS-8 / ELS-16 terminal servers. Plug one end of the cable into the printer port on the server. Plug the other end of the cable into the parallel port of your printer. An adaptor cable in required to connect DataProducts printers, or printers using a DataProducts connector.

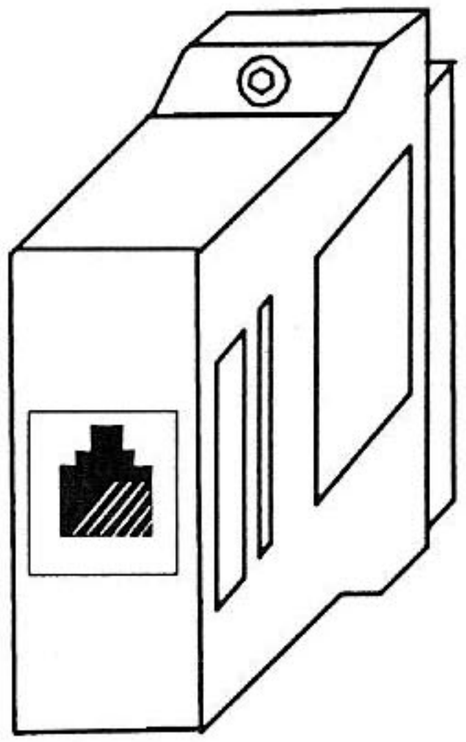


Figure 2-3 Modular Adaptor

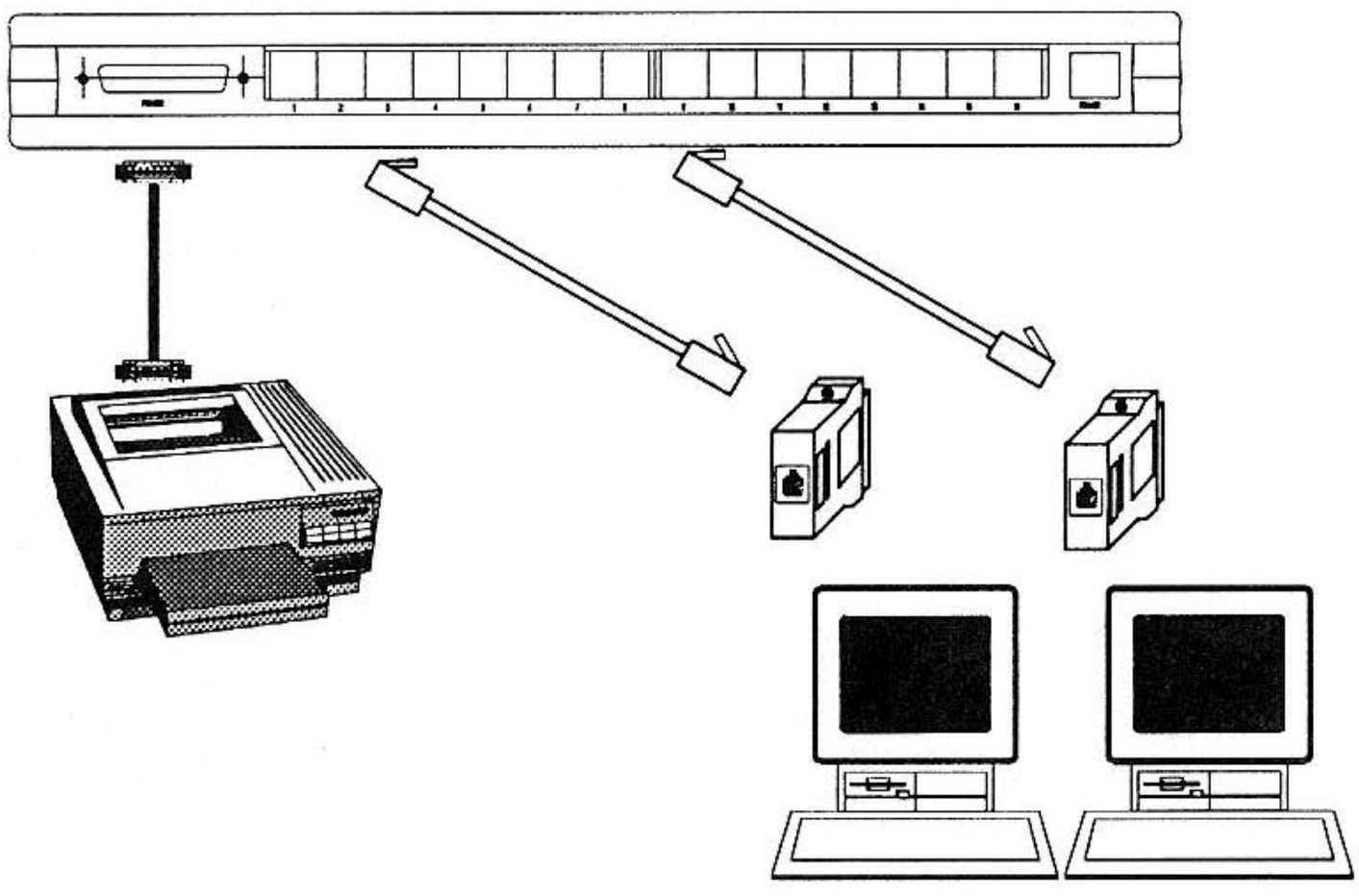
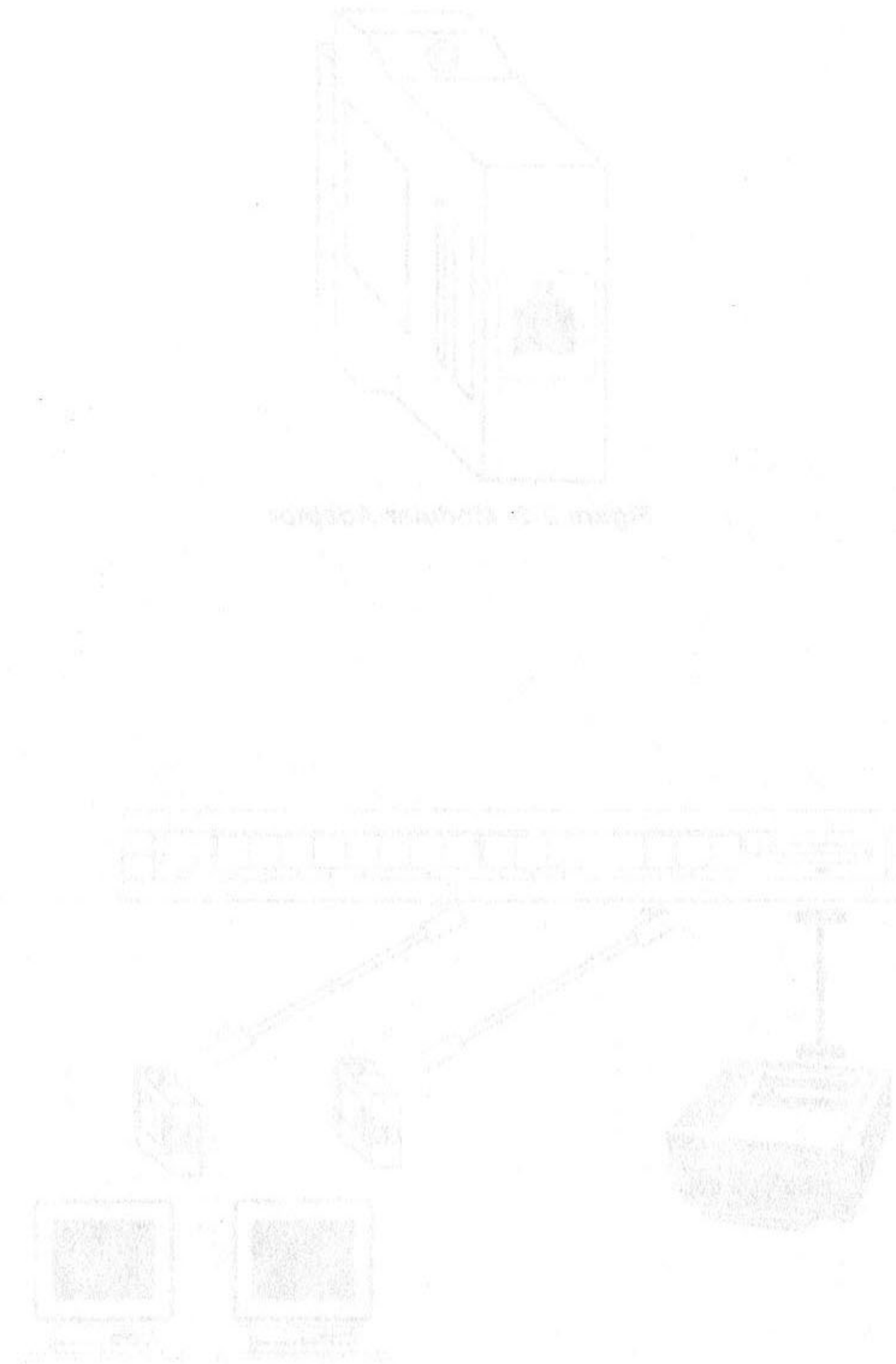


Figure 2-4 Connecting Devices



Chapter 3 Terminal Server Basics

The ELS-8 and ELS-16 terminal servers are dual protocol servers supporting LAT and TCP/IP, including TELNET and RLOGIN. Whichever protocol you use, there are basic principles that apply to all implementations of the servers. Section 3 provides a general introduction to basic operation of the server. For specific protocol implementations refer to the appropriate section of this manual.

Default Settings

The terminal server is configured to factory default settings. All of the ports on the server are configured to operate as an interactive terminal with the settings shown below:

Baud Rate	**9,600**
Data Bits	**8**
Parity	**None**
Autobaud	**Enabled**

The server automatically adapts to the speed of your terminal because the factory default is **AUTOBAUD ENABLED.**

Getting the Local Prompt

Follow these steps to begin communicating with your server:

① Press **<CR>** to get the server's attention.

The server displays its *name, identification string* and a *welcome message.*

② The server then prompts you to enter a *username.*

Enter your name and press **<CR>**.

③ The server responds with the LOCAL> prompt. This means you are logged onto the server and can begin using it.

Enter the following commands at the prompt to get a feel for how the server works:

- Display a list of *services* available on the network:

  LOCAL> **SHOW SERVICES**

- Read the introduction to the server HELP:

  LOCAL> **HELP**

- View the current terminal server default settings of your port:

  LOCAL> **SHOW PORT**

Remote console operates like DEC's remote console (accessed through NCP) with one exception: you do not have to have your VAX running to use remote console with the ELS-8 or ELS-16. This means you do not need a VAX in your network at all.

Using this feature the system manager can connect to any Equinox server on his network from any other server (including non-Equinox servers) on the network. Once connected the system manager is logged into the server and may configure it or access any information about the server.

Remote console works in a unique manner. Each Equinox server has a permanently configured remote console service. This service appears as follows when a privileged user types **SHOW SERVICES LOCAL:**

Service Name	Status	Identification
RC_00807D012345	Available	Remote Console on node LAT_00807D012345

For example, if the **node name** is changed to "FINANCE_DEPT", the identification is automatically modified by the server as follows:

Service Name	Status	Identification
RC_00807D012345	Available	Remote Console on node FINANCE_DEPT

This service is broadcast on the network like any other service and is available for connection from any server. **CLEAR/PURGE/DELETE SERVICE** does not remove the remote console service from a server. Nonprivileged users do not see the service when they type **SHOW SERVICES** on an Equinox server, however users on non-Equinox servers do see the service.

There are four different ways to connect as a remote console to an Equinox server:

① Local>> **REMOTE** ***node name***

Node name is the default or assigned node name for the remote console.
Using the example above:

```
Local>> REMOTE LAT_00807D012345
```

or

```
Local>> REMOTE FINANCE_DEPT
```

② Local>> **REMOTE** ***remote console service name***

Remote console service name is the name assigned to the remote console service by the server.

Using the example above:

```
Local>> REMOTE LAT_00807D012345
```

③ Local>> **REMOTE** ***ethernet address***

Ethernet address is the 16 hex character Ethernet address formatted as follows:

```
Local>> REMOTE 00-80-7D-01-23-45
```

④ Local>> **REMOTE** ***serial number***

Serial number is the permanently assigned number for the Ethernet Control Board in an Equinox server. The serial number is on the **SHOW SERVER** screen of an Equinox server. It is also stamped on the back of the Ethernet control boards.

For example:

```
Local>> REMOTE XB001009
```

From a non-Equinox server you can connect to the remote console only by **CONNECT**ing to the *service name*:

```
Local> CONNECT RC_00807D012345
```

Use any of the above methods to connect to the desired remote console. Enter the login password when prompted. The default password is **ACCESS.**

```
Local>> REMOTE FINANCE_DEPT


Local -010- Session 1 to RC_00807D012345 established

#> password

FINANCE_DEPT
Equinox Systems Inc., ELS-8
Welcome to the Equinox Server Network

Local>
```

You are now fully logged into the remote server! Execute commands or configuration changes as if you were directly connected to the server then simply **LOGOUT** when finished:

```
Local> LOGOUT

Local -010- Session 1 disconnected from RC_00807D012345

Local>>
```

Guidelines for Using Remote Console

☞ The remote console facility is on a non-physical or virtual port. This means that certain actions are not valid:

- ✔ Some commands, such as **SHOW PORT**, are not valid because there is no physical port connected.
- ✔ Configurations of a remote console port cannot be changed.
- ✔ Ongoing connections cannot be made from a remote console.

Note: Some commands such as **SET/DEFINE/CHANGE SERVER CIRCUIT TIMER** *and* **SET/DEFINE/ CHANGE SERVER NAME** *cannot be changed while remote console is active. See Appendix A Commands.*

☞ While the remote console is in use the server has a fully operational virtual circuit on the network. Since this is an active virtual circuit, many of the server configuration parameters related to the network cannot be altered. If you need to change these parameters, use the **DEFINE** command to change only the permanent database. The new value will take effect at the next initialization of the server.

☞ If you want to **INITIALIZE** a server via the remote console simply type **INITIALIZE SERVER**. There will be no response to your command, but after about 10 seconds the connection will be broken and you will be at the local prompt of your own server again. Once the remote server completes initialization you may connect to it again.

☞ Use remote console to:

- ✔ Completely configure all servers on your network through one server.
- ✔ Monitor server counters and usage levels of any server.
- ✔ Broadcast messages to users on any server.
- ✔ Check port status on remote servers for ports not being used (i.e. in local mode with a long period of inactivity) and log them off.
- ✔ Use the **TEST PORT** command to check the validity of hardware connections to ports.

Returning the Terminal Server to Factory Default Settings

CAUTION

Use the procedure outlined in this section with caution. It is disruptive to <u>all</u> active users of the server. They will be logged off automatically and all sessions will be discontinued.

Caution: Pressing the reset button erases all configuration information stored in the non-volatile memory on your controller board. ALL configuration settings will be returned to factory default settings.

There will be times you will want to return your server to its factory default settings (e.g. your terminal screen does not display the messages in the preceding examples).

① You can easily return your server to factory default settings by pressing the *reset* button located on the front panel of the server.

Use a pointed object such as a pencil to hold the button in for several seconds. In approximately five seconds, the **LEDs** on the control board will start to blink rapidly. Release the button. The **LEDs** will continue to blink while the non-volatile memory is erased and rewritten. The **LEDs** return to a normal state in about 15 seconds.

② After completing the above procedure, repeat the steps on the previous page. You should now see the server's messages and prompt. If you still don't see anything, check the wiring and settings on your terminal.

Also make sure the **READY LED** on both the control board and the port board are solid. If **either LED** is flashing it means you have a hardware problem and should contact Equinox Technical Support.

What services are available on the network?

As soon as you connect the server to the Ethernet, it automatically begins to *learn* what services are available. It does this by listening to *multicast* messages from other *servers* and *service nodes*. The server gradually builds a list of *service names* available on the network. This takes several minutes.

NOTE: For true transparent operation in the transfer of binary files, etc., you must set up your port with the **SET SESSION TYPE PASSALL** *command. See Appendix A, Commands.*

To display the list of names use the **SHOW SERVICE** command. A list of service names displays. You can select any of these service names to connect to. For example, to connect to a service named VAX which displays in your list of available services, type:

LOCAL> **CONNECT VAX**

The server connects you to the VAX. The VAX login prompt displays asking you for your USERNAME.
Once you connect to a service, you are in a *session*. The terminal server is no longer part of the process except to transparently move the data and commands between your terminal and the service you connected to, in the above case the VAX.

Multiple Sessions

You can be connected to more than one session at a time on the server. You do this by *suspending* your current session and connecting to another service. This is referred to as **multiple sessions**. In effect, you are connected to one service while another session is on hold. Although you can change the number of sessions you can have open at one time, the default is four sessions.

Follow these steps to connect to multiple sessions:

① Connect to the first service. For example, connect to the VAX:

LOCAL> **CONNECT VAX**

NOTE: You can define a ***local switch*** *character to perform the same function as the* **<BREAK>** *key. Refer to* **SET/DEFINE/CHANGE PORT LOCAL SWITCH** *in Appendix A Commands.*

② Suspend your current session by pressing the **<BREAK>** key on your keyboard. This gets the attention of the terminal server and returns you to LOCAL mode.

Remember that your current session is **not** disconnected. You can resume this session at any time with the **RESUME** command.

③ Connect to a new service:

LOCAL> **CONNECT** ***service name***

The server connects you to the new service while holding your previous session ready for you to resume.

④ To return to the previous session, and keep the second session active, press the <**BREAK**> key to return to LOCAL mode. Resume the previous session by typing **RESUME** or **R**.

The **SHOW SESSIONS** command displays a list of all the sessions you have on hold at any given time. The server assigns a *session number* to a session when you place it on hold. Use this number to resume a specific session when you have more than one session on hold.

The following example shows three different commands you can use to resume a session. Substitute your session number for the **3** in the example (any one of these commands will resume session 3):

```
LOCAL> RESUME 3
```

or

```
LOCAL> R 3
```

or

```
LOCAL> 3
```

Switching Between Sessions

Multiple sessions are especially useful when you have to simultaneously move between several different applications. Although you can easily move to LOCAL mode and select the specific session you want to change to, there are two other ways to resume concurrent sessions:

Note: *If a host computer tries to send data for a session that is on hold to your terminal, that data is held in a buffer until you resume the session.*

❑ Use the **SET/DEFINE/CHANGE PORT FORWARD** or **SET/DEFINE CHANGE PORT BACKWARD** commands to specify a switching character that will move you automatically between sessions without having to go into LOCAL mode. With the switch character you can move through the session list one session at a time until you resume the session you want to work in.

❑ When you are in LOCAL mode, use the **FORWARD** and **BACKWARD** commands to resume the next or previous session in your session list.

Disconnecting From Sessions

Note: *You do not have to log off the server. If the server is a shared resource you would want to log off to make it available to other users. If you do not log off the server you will remain in* **LOCAL>** *mode.*

When you are finished with a session on the server, you should end the session. Use one of the following methods to disconnect from a session:

- **LOGOFF**
  Logoff the host that offers the service. The terminal server automatically disconnects all sessions and returns you to LOCAL mode.

- **<BREAK>**
  Press the **<BREAK>** key to return to the LOCAL mode on the server. Then type **DISCONNECT**. When you press the **<BREAK>** key the server places the current session on hold. The **DISCONNECT** command actually ends the session. If you have more than one session active, the current session is the only one that is disconnected.

- **LOCK**
  You do not have to disconnect from a service if you are working with confidential data and need to be away from your desk. Use the **LOCK** command to protect your terminal while you are gone. You can then return to your session without having to reconnect, login, etc. See *Appendix A Commands*.

- **DISCONNECT ALL**
  If you want to disconnect all of your active sessions enter **DISCONNECT ALL** at the LOCAL prompt.

Don't forget to use the CLS command to erase sensitive data from your screen before LOCKing your port. This command clears your screen.

COMMANDS

Appendix A, Commands provides detailed information on the commands and command syntax for the terminal server. This section of the installation manual gives you a brief overview of the commands and their use in network management.

The principles for command use are the same for all protocols on the server. Refer to the following sections for protocol-specific configuration assistance:

- ❑ Section 4 Using LAT Protocol
- ❑ Section 5 Using TCP/IP Protocol
- ❑ Section 6 Using Dual Protocol

Entering Commands

You operate and configure the terminal server by entering commands at the LOCAL> prompt. The commands you enter fall into one of the following categories:

Operational Commands

Use these commands to connect to services, switch between sessions, disconnect services, etc.

Database Commands

Use these commands to enter configuration information (e.g., baud rate and parity for each port), Ethernet operating characteristics, security information (e.g., passwords and access restrictions), customizing prompts and messages, etc.

Network Management Commands

Use these commands to monitor server activity, port activity and usage, test ports, monitor Ethernet usage, etc.

Privileged / Nonprivileged Commands

There is a further distinction within each of the above categories that gives user's the ability to execute specific commands. User's are given *privileged* or *nonprivileged* status depending upon how you set up your network.

Privileged users are typically system managers. They are given the capability of changing the configuration of **any** port on the server, disconnecting sessions and resetting (initializing) the

server. The only thing they cannot do is look at another user's private **PORT LOCK** password.

Nonprivileged users cannot do anything that would affect another user on the server. Usually they only use the server to connect to services.

When you log onto the server initially you are considered to be a **nonprivileged** user. Follow these steps to enter **privileged** mode:

① At the LOCAL> prompt type:

```
LOCAL> SET PRIVILEGED
```

Note: The privileged password can be changed with the **SET/DEFINE/ CHANGE SERVER PRIVILEGED PASSWORD** *command. See Appendix A, Commands.*

② The server responds by asking you to enter a *password*. The default password set at the factory is **SYSTEM**.

```
PASSWORD> SYSTEM
```

③ You are returned to the LOCAL> prompt after you enter the correct password. The prompt now indicates you are a privileged user by displaying the prompt with a second **>**:

```
LOCAL>>
```

④ You can now execute any server commands. Return to nonprivileged mode when you have finished using privileged commands:

```
LOCAL>> SET NOPRIVILEGED
LOCAL>
```

Note that the prompt returns to a single **>**.

You will not be able to enter privileged mode if another user is logged on as a privileged user, or if another port was left in privileged mode. To override the other port's privilege:

```
LOCAL> SET PRIVILEGED OVERRIDE
```

This takes the other port **out** of privileged mode and makes you the privileged user.

Only one port can be in privileged mode at a time.

Command Line Editing

The terminal server uses *command line editing* to make entering and changing commands easier. This feature functions in a manner similar to DEC's command line editing. The terminal server has a buffer that stores the last **512** bytes typed at the keyboard. You can *recall* previous command lines and then edit them to correct or create new commands.

Control characters are used to perform this editing. A control character is a combination of two keys, the <**CTRL**> key and another key that you press while holding down the <**CTRL**> key. Often you will see the control key displayed as a carat (^) followed by the second character, such as ^A, ^Z, etc.

The following table lists the keys you can use to edit commands on the command line:

Key	How to use....
<CTRL> A	Toggles between insert and overwrite modes. Position your cursor anywhere on the command line, press ^**A** and insert the characters in the command line.
<CTRL> B	Recalls the previous command line(s), one line at a time. On ANSI terminals you can also use the up arrow (↑) key.
<CTRL> D	Moves the cursor to the left one position. On ANSI terminals you can also use the left arrow (←) key.
<CTRL> E	Moves the cursor to the end of the command line.
<CTRL> F	Moves the cursor to the right one position. On ANSI terminals you can also use the right arrow (→) key.
<CTRL> H	Moves the cursor to the beginning of the command line.
<CTRL> J	Deletes the previous word.
<CTRL> R	Redraws the current command line. This lets you check your edits before accepting the line.
<CTRL> U	Erases an entire command line.
<CTRL> Z	Aborts the entry of a password. You can also use this to exit HELP.
BACKSPACE	Use the backspace key to move your cursor to the beginning of a line without erasing any characters on the line. This is available on ANSI terminals only.
BREAK	Halts the current command line or display.
DELETE or RUBOUT	Erases the character immediately to the left of the cursor.
CR (carriage return)	Executes the current command line.

The terminal server includes a great many commands and features. We have included an extensive online help facility so that you are not constantly having to turn to the manual to answer quick questions.

① To access *help*, type:

```
LOCAL> HELP
```

The server displays a list of commands for which there is additional help. The prompt displays as TOPIC?. The commands that display depend upon whether you are currently a *privileged* or *nonprivileged* user.

Enter a ? to repaint the list of commands displayed when you first enter HELP.

② To display help on a specific topic, select a command from the list and enter it at the prompt:

```
TOPIC? LOGOUT
```

You can exit HELP at any time by pressing ^Z.

An explanation of the command and any parameters displays. If there is any additional help text that relates to this command, a list of *subtopics* displays after the explanation. You can continue to select additional topics and subtopics until you have an understanding of the command.

③ There is an alternate method of accessing help that does not require that you work your way through the help menus. At the prompt, type **HELP** followed by the command you want additional information on.
For example, assume you want an explanation of how to change the default privileged password. You would type:

Note: *Remember that certain commands are available to privileged users only. If you attempt to get help on a privileged command and are not in privileged mode, a message displays that tells you the command requires privileged mode.*

```
LOCAL>> HELP CHANGE SERVER PRIVILEGED PASSWORD
```

The server responds by displaying information about the *privileged password* command.

Operational Commands

Operational commands are usually entered with required and/or optional parameters that determine what the command will do. These commands are typically routine commands used on a daily basis by all users (*privileged* and *nonprivileged*).

Operational commands are listed below. For a detailed description of each command and their valid parameters, refer to *Appendix A Commands*.

BROADCAST	Sends a message to one or more ports on your server.
CLS	Clears your terminal display.
CONNECT	Connects to services on the Ethernet network.
DISCONNECT	Disconnect services on the Ethernet network.
HELP	Displays the help menus.
LOCK	Places your port in a secure or locked state while you are away from the terminal.
LOGOUT	Logs the terminal server off.
RESUME	Returns you to a session that you had placed on hold.
SHOW	Displays a ports configuration, lists service names, examines a ports status, etc.
1 | 2 | 3 | 4	Toggle between sessions.

The **permanent** and **operational** databases contain all the information required by the terminal server to operate. The operational database is maintained in memory while the server is turned on. The permanent database is store in permanent memory.

The two databases are identical when the server is turned on for the first time. Database commands make up the largest set of commands for the terminal server.

The **SET**, **DEFINE** and **CHANGE** commands are used to configure the databases. All three commands use the same parameters but affect different terminal server databases:

SET **SET** changes the *operational* database. For example, when you **SET** the baud rate of a port, you change the baud rate in the operational database only. When you later log off the server, or when the server is powered off, the port is set back to the original baud rate setting stored in the permanent database.

DEFINE **DEFINE** changes the *permanent* database. For example, when you **DEFINE** the baud rate of a port, you change the baud rate in the permanent database. The baud rate on your port is not actually changed until you power off the server, power it back on and log back into the port. You can also use the command **INITIALIZE SERVER** to effect the change.

CHANGE **CHANGE** changes both the *permanent* and the *operational* databases with a single command. For example, when you **CHANGE** the baud rate of a port, you change the baud rate in both the permanent and the operational database immediately.

Database commands are listed below. For a detailed description of each command and their valid parameters, refer to *Appendix A, Commands.*

SET/DEFINE/CHANGE	Makes configuration changes to the operational and/or permanent databases.
CLEAR/PURGE/DELETE	Removes local service names from the operational and/or permanent databases.
SAVE	Copies the current operational database to the permanent database.
RESTORE	Restores the permanent database to the operational database.
SHOW/LIST	Lists the database settings.

Network Management Commands

Network management commands are useful when you are diagnosing problems with your server. For example, **MONITOR PORT STATUS** will tell you why certain ports are locking up. Or, **TEST PORT** and a loopback connector help to locate data errors on a terminal located some distance from the server.

You can also monitor many different counters that provide information on network activity, data errors, port errors, etc.

Network management commands are listed below. For a detailed description of each command and their valid parameters, refer to *Appendix A Commands*.

INITIALIZE SERVER	Resets the server. This is equivalent to powering the server off.
SHOW / LIST / MONITOR	Displays changing events on the server in real time.
REMOVE QUEUE	Deletes entries from the printer queue.
TEST	Sends a test pattern out a port, performs loopback testing, etc.
ZERO COUNTERS	Resets the error counters, data counters, etc. This lets you do analysis for specific time periods.

The ELS-8 and the ELS-16 terminal servers are preset to *factory default configuration*. The configuration settings are commonly used values. In many cases you will be able to plug in your server and begin using it right away. However, at some point you will probably want to makes changes to meet your specific network requirements. Areas where you are most likely to want to change configurations are:

- **SERVER**
  Operating parameters have to be established for the server. Parameters include circuit timer, multicast timer, session limits, etc.

- **PORTS**
  Configure the communications settings for ports on the server. This includes baud rate, parity, etc. You can also configure some of the operational characteristics for users.

- **NODES**
  TCP/IP nodes have to be defined in the terminal server's internal node table. Parameters include the Ethernet address of the node, assigning an alias to the node, the IP address, etc.

- **SERVICES**
  If the server is going to be a *service node*, services to be offered must be defined.

Plan your changes before you begin changing settings.